

CLAIMS

WHAT IS CLAIMED IS:

1. A calibratable force-measuring and force-applying clamp, comprising:
 2. an adjustable clamp, said adjustable clamp adjustably applying force to a workpiece object;
 4. a strain gage coupled to said adjustable clamp and detecting elastic deformation in said adjustable clamp when said adjustable clamp applies force to said workpiece object, said strain gage transmitting a strain signal;
 6. a data acquisition circuit coupled to said strain gage and receiving said strain signal, said data acquisition circuit transmitting a data signal and having a span circuit and a zero circuit; and
 8. a display coupled to said data acquisition circuit, said display receiving said data signal and displaying symbols characterizing an amount of force applied to said workpiece object by said adjustable clamp; whereby
 10. force applied by said adjustable clamp to said workpiece object may be calibrated for a zero point and a load point to enable precise and accurate determination of applied force.
12. A calibratable force-measuring and force-applying clamp as set forth in Claim 1, wherein said adjustable clamp incorporates said strain gage, said data acquisition circuit, and said display.
14. A calibratable force-measuring and force-applying clamp as set forth in Claim 1,

2 wherein said strain gage further comprises a full bridge strain gage.

4. A calibratable force-measuring and force-applying clamp as set forth in Claim 1,

2 wherein said data acquisition circuit further comprises:

4 an amplifier; and

4 a voltage reference source, said voltage reference source coupled to said
amplifier via said strain gage.

5. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said data acquisition circuit further comprises:

4 a monolithic chip incorporating both said amplifier and said voltage
reference source.

6. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said span circuit is coupled to and controls gain of said amplifier.

7. A calibratable force-measuring and force-applying clamp as set forth in Claim 6,

2 wherein said span circuit is a potentiometer coupled across inputs to said amplifier.

8. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said zero circuit is coupled to and affects output of said voltage reference
source.

9. A calibratable force-measuring and force-applying clamp as set forth in Claim 8,

2 wherein said zero circuit is a potentiometer coupled across connections to said voltage
reference source.

10. A calibratable force-measuring and force-applying clamp as set forth in Claim 9,

2 wherein a wiper of said zero circuit coupled to said strain signal.

11. A calibratable force-measuring and force-applying clamp, comprising:

2 an adjustable clamp, said adjustable clamp adjustably applying force to a
workpiece object;

4 a strain gage coupled to said adjustable clamp, said strain gage including
a full bridge strain gage and detecting elastic deformation in said adjustable
clamp when said adjustable clamp applies force to said workpiece object, said
strain gage transmitting a strain signal;

6 a data acquisition circuit having a span circuit and a zero circuit and
including an amplifier and a voltage reference source incorporated into a
monolithic chip, said amplifier coupled to said voltage reference source via said
strain gage, said data acquisition circuit coupled to said strain gage and
receiving said strain signal, said amplifier transmitting a data signal;

8 said span circuit being a first potentiometer coupled across inputs to said
amplifier and controlling gain of said amplifier;

10 said zero circuit being a second potentiometer coupled across
connections to said voltage reference source, a wiper of said zero circuit

coupled to said strain signal, said zero circuit affecting output of said strain
18 signal;

a display coupled to said data acquisition circuit, said display receiving
20 said data signal and displaying symbols characterizing an amount of force
applied to said workpiece object by said adjustable clamp; and

22 said adjustable clamp incorporating said strain gage, said data acquisition
circuit, and said display; whereby

24 force applied by said adjustable clamp to said workpiece object may be
precisely and accurately determined by inspection of said display.

12. A force-measuring and force-applying clamp, comprising:

2 an adjustable clamp, said adjustable clamp adjustably applying force to a
workpiece object;

4 a strain gage coupled to said adjustable clamp and detecting elastic
deformation in said adjustable clamp when said adjustable clamp applies force to
6 said workpiece object, said strain gage transmitting a strain signal;

8 data acquisition circuit having an amplifier coupled to a voltage reference
source across said strain gage, said data acquisition circuit receiving said strain
signal, said data acquisition circuit transmitting a data signal; and

10 a display coupled to said data acquisition circuit, said display receiving
said data signal and displaying symbols characterizing an amount of force
12 applied to said workpiece object by said adjustable clamp; whereby

force applied by said adjustable clamp to said workpiece object may be

14 precisely and accurately determined.

13. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 12, wherein said data acquisition circuit has a span circuit and a zero circuit, said span
4 circuit coupled to said amplifier and said zero circuit coupled to said voltage reference
source.

14. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 12, wherein said adjustable clamp incorporates said strain gage, said data acquisition
4 circuit, and said display.

15. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 12, wherein said strain gage further comprises a full bridge strain gage.

16. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 12, wherein said data acquisition circuit further comprises:
4 a monolithic chip incorporating both said amplifier and said voltage
reference source.

17. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 13, wherein said span circuit controls gain of said amplifier.

18. A calibratable force-measuring and force-applying clamp as set forth in Claim

2 17, wherein said span circuit is a potentiometer coupled across inputs to said amplifier.

19. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 13, wherein said zero circuit affects output of said voltage reference source.

20. A calibratable force-measuring and force-applying clamp as set forth in Claim
19, wherein said zero circuit is a potentiometer coupled across connections to said
2 voltage reference source.

21. A calibratable force-measuring and force-applying clamp as set forth in Claim
2 20, wherein a wiper of said zero circuit coupled to said strain signal.